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(51) INT CL⁶

G06F 17/30

(52) UK CL (Edition Q.)

G4A AUXX

(56) Documents Cited

EP 0802492 A1

EP 0762297 A2

EP 0378848 A2

US 5404295 A

(58) Field of Search

UK CL (Edition Q.) G4A AUSB AUXX

INT CL⁶ G06F

(54) Abstract Title

Automatic adaptive document help system

(57) In an automatic reading assistance system for electronic documents (502), an automatic annotator (508) finds concepts of interest (512) and keywords. The operation of the annotator is personalizable (518) for a particular user. The annotator is also capable of improving its performance over time by both automatic and manual feedback. Another available feature is a thumbnail image of all or part of a multi-page document wherein a currently displayed section of the document is highlighted in the thumbnail image. Movement of the highlighted area in the thumbnail image is then synchronized with scrolling through the document.

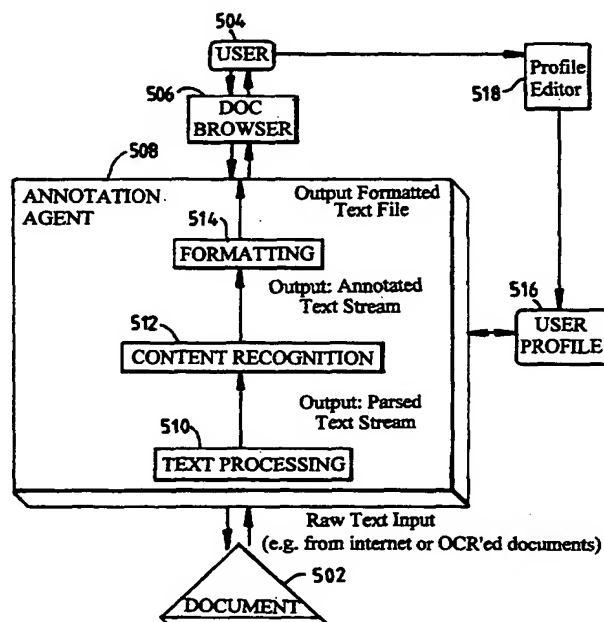


Fig. 5

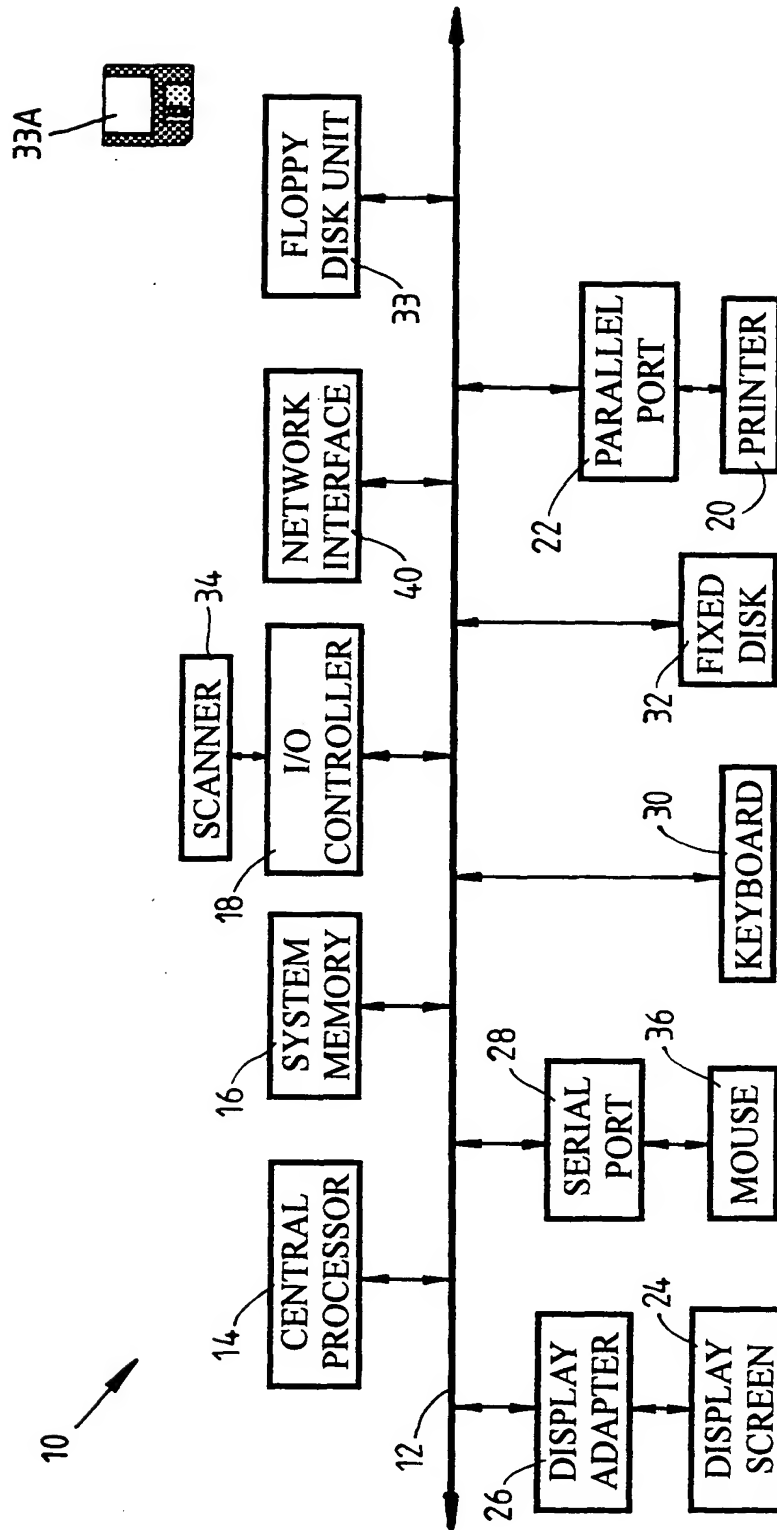


Fig. 1

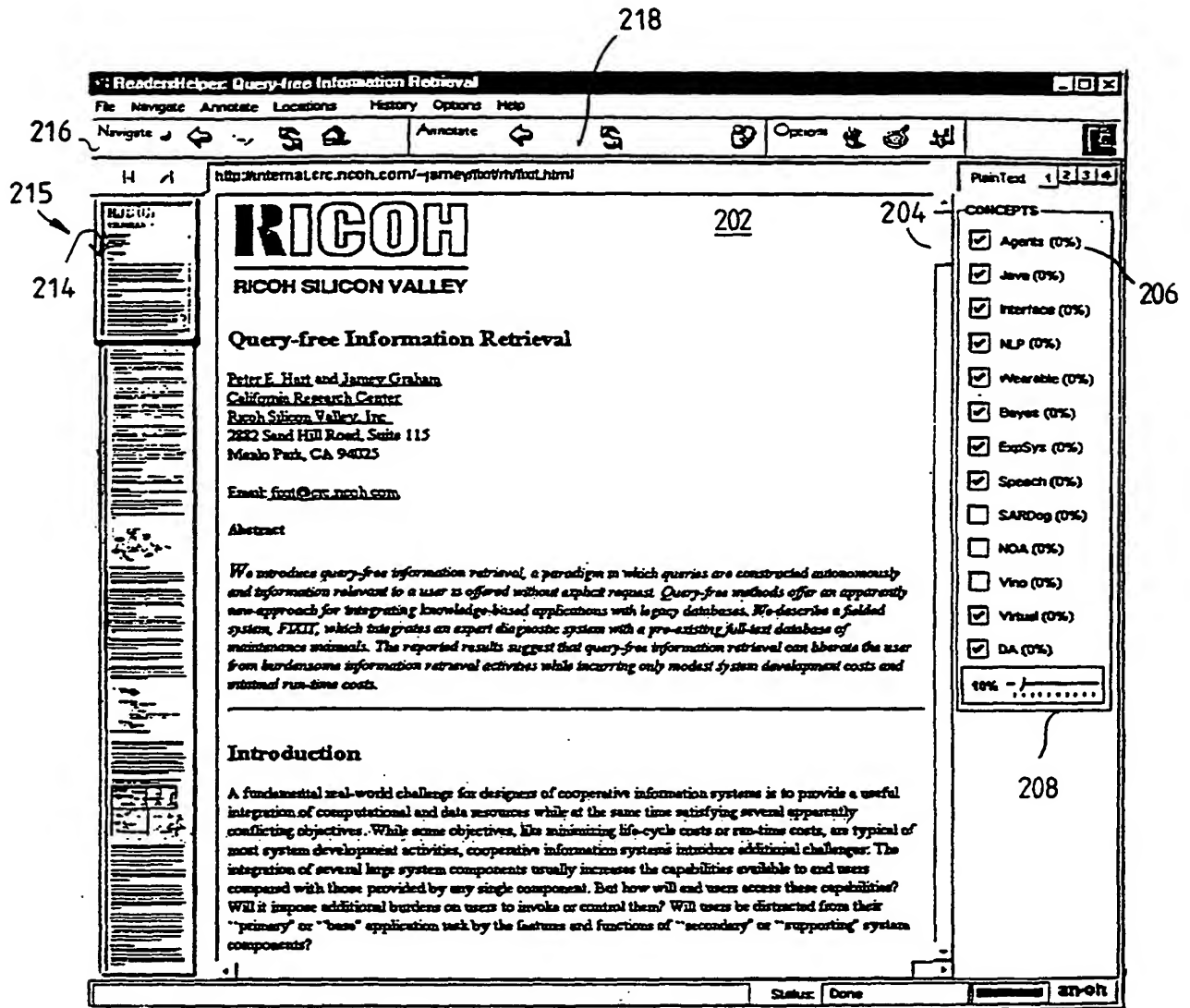


Fig. 2A

ReadersHelper: Query-free Information Retrieval

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http://internal.crc.nicoh.com/~jamey/fixit/rh/fixit.html

of substantial complexity be integrated within a larger system context? By requiring that all interactions with the legacy database be mediated by the agent, we have been able to isolate the database system cleanly while still supporting query-free information retrieval.

220 220 220

FIXIT is comprised of the three subsystems already mentioned: the probabilistic expert system, the legacy full-text database system (to which we added a new, semantically-based, indexing structure that supports limited natural language queries), and the intelligent agent that effectively integrates them. The following sections describe these system components, provide implementation details, illustrate the runtime behavior of FIXIT, report on operational experience, and close with some observations about query-free information retrieval and the potential for generalizing the underlying paradigm.

222

FIXIT's System Components

We first describe the probabilistic expert sub-system and the information retrieval sub-system. Before briefly describing these, we stress that our purpose was not necessarily to advance the capabilities of the individual components or indeed even to exploit fully the best current technology; instead, we focus on their integration.

Expert System Component.

For our purely diagnostic applications, we elected to use the belief net (or Bayesian net) representation that has received considerable attention in recent years.

220

Belief networks use conditional probabilities of the form $p(s_j | f_i)$ to represent associations between a fault f_i and an observable symptom s_j that it may produce. A knowledge base for a belief net expert system consists principally of a collection of conditional probabilities of this form.

220

The relations among faults and symptoms are conveniently represented as a directed acyclic graph as shown in Figure 1.

CONCEPTS

- ☒ Agents (33%)
- ☒ Java (0%)
- ☒ Interface (4%)
- ☒ NLP (33%)
- ☒ Wearable (0%)
- ☒ Bayes (70%)
- ☒ ExpSys (94%)
- ☒ Speech (0%)
- ☐ SARDog (0%)
- ☐ NOA (0%)
- ☐ Viro (0%)
- ☒ Virtual (0%)
- ☒ DA (0%)

10%

Status Done

Fig. 2B

ReaderHelper: Query-free Information Retrieval

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http://internal.crc.nrcn.com/~jameyfoxt/rvibdi.html

of substantial complexity be integrated within a larger system context? By requiring that all interactions with the legacy database be mediated by the agent, we have been able to isolate the database system cleanly while still supporting query-free information retrieval.

224

FDKIT is comprised of the three subsystems already mentioned, the probabilistic expert system, the legacy full-text database system (to which we added a new, semantically-based, indexing structure that supports limited natural language queries), and the late Digest agent that effectively integrates them. The following sections describe these system components, provide implementation details, illustrate the runtime behavior of FDKIT, report on operational experience, and close with some observations about query-free information retrieval and the potential for generalizing the underlying paradigm.

FDKIT's System Components

We first describe the probabilistic expert sub-system and the information retrieval sub-system. Before briefly describing these, we stress that our purpose was not necessarily to advance the capabilities of the individual components or indeed even to exploit fully the best current technology; instead, we focus on their integration.

224

Expert System Component

For our purely diagnostic applications, we elected to use the belief net (or Bayesian net) representation that has received considerable attention in recent years.

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The relations among faults and symptoms are conveniently represented as a directed acyclic graph as shown in Figure 1.

224

10%

Status: Done an-oh

Fig. 2C

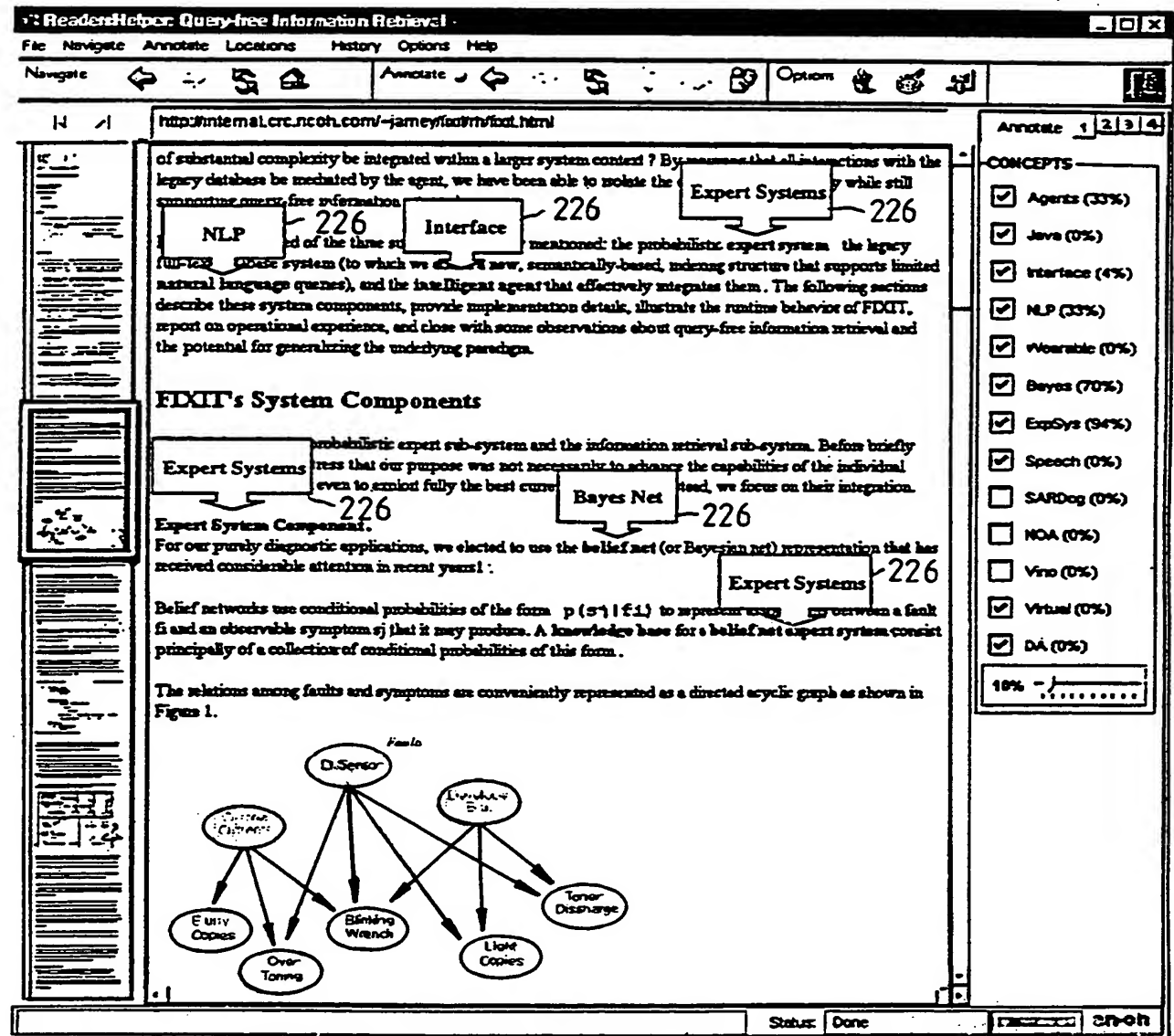


Fig. 2D

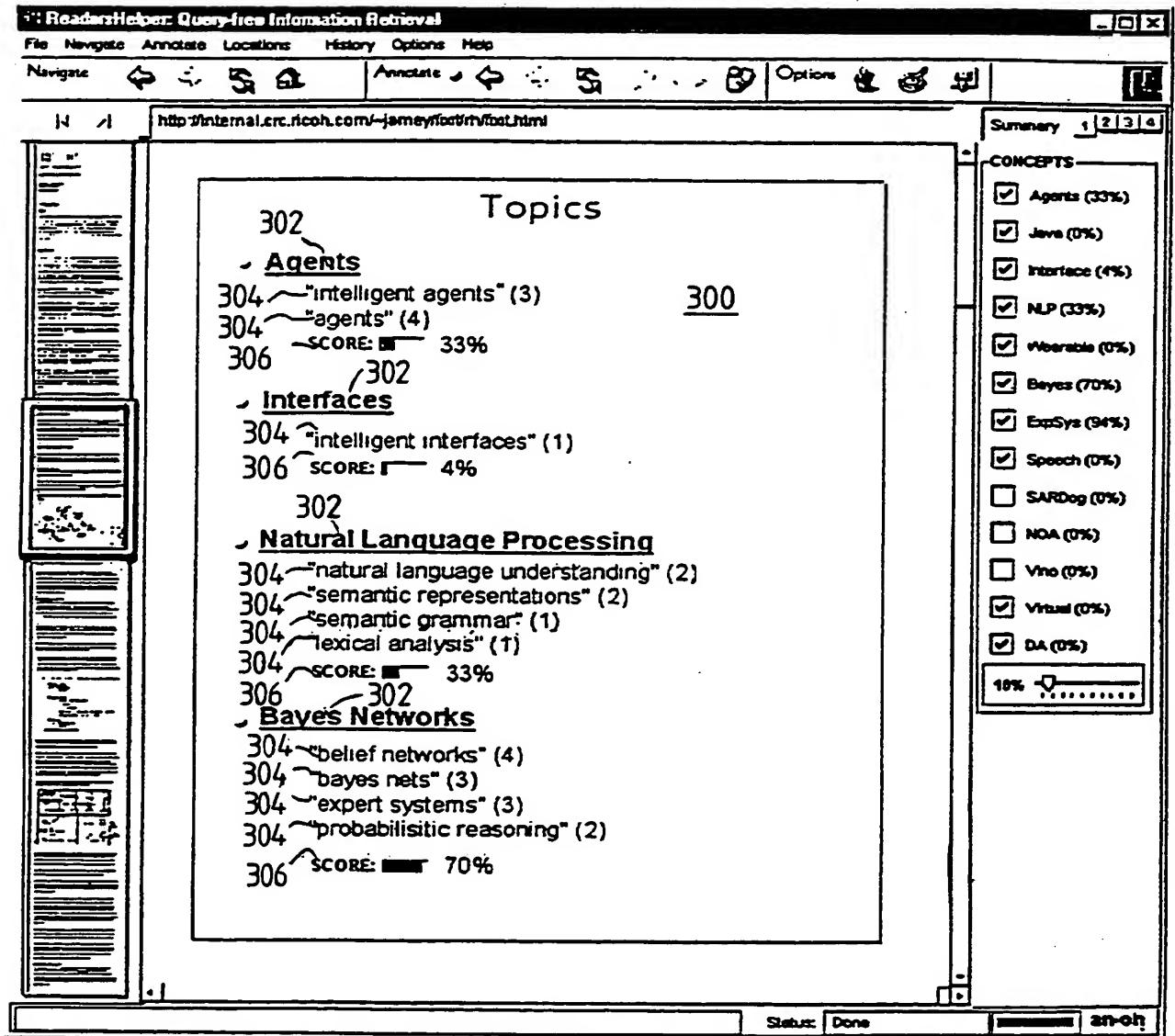


Fig. 3

ReaderHelper: Query-free Information Retrieval

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http://internal.crc.nicoh.com/~jameyfor/fixit.html

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CONCEPTS

- ☒ Agents (33%)
- ☒ Java (0%)
- ☒ Interface (4%)
- ☒ NLP (33%)
- ☒ Wearable (0%)
- ☒ Bayes (70%)
- ☒ ExpSys (94%)
- ☒ Speech (0%)
- ☐ SARDog (0%)
- ☐ NOA (0%)
- ☐ Viro (0%)
- ☒ Virtual (0%)
- ☒ DA (0%)

10%

Status: Done

Fig. 4

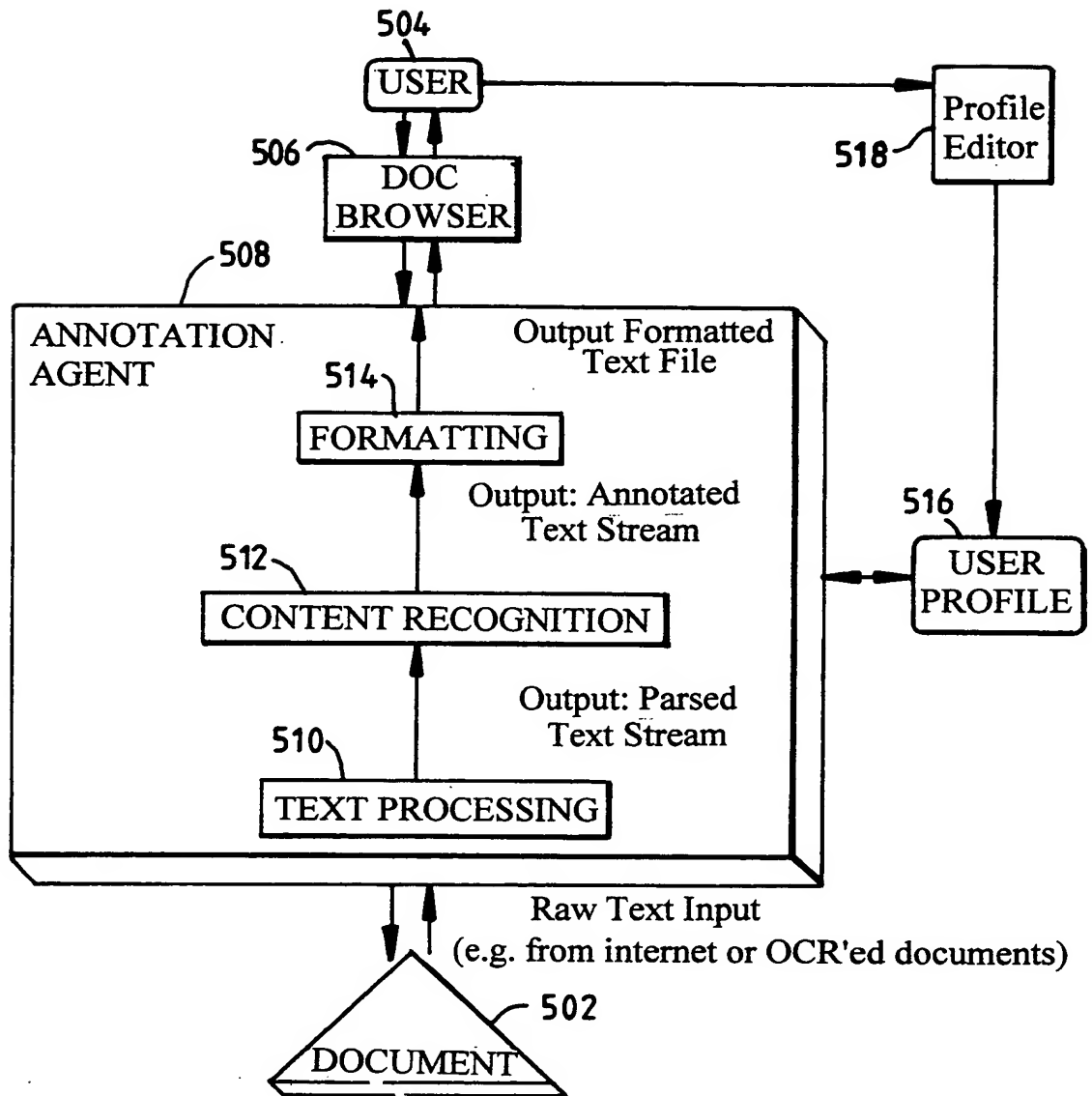


Fig. 5

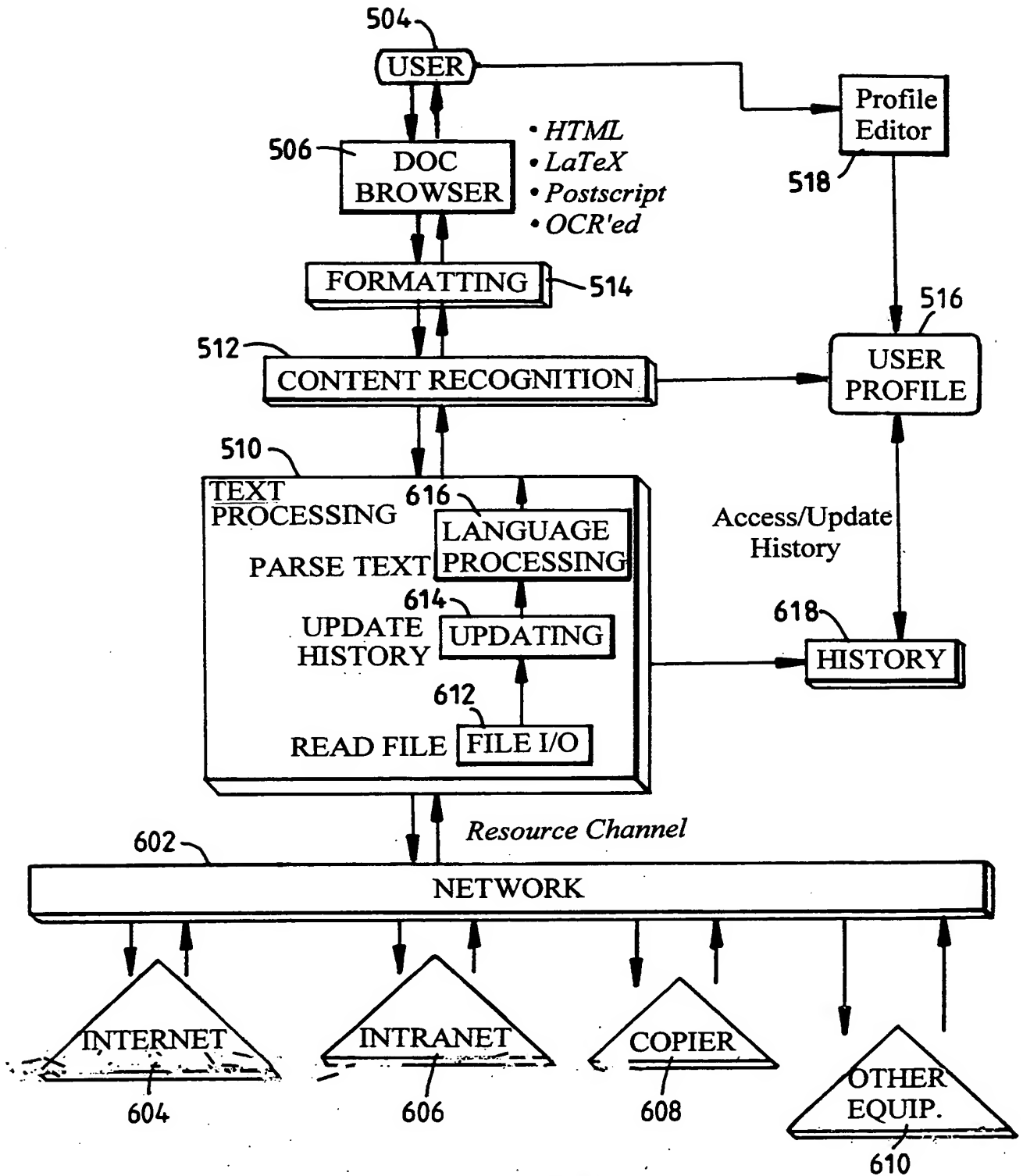


Fig. 6A

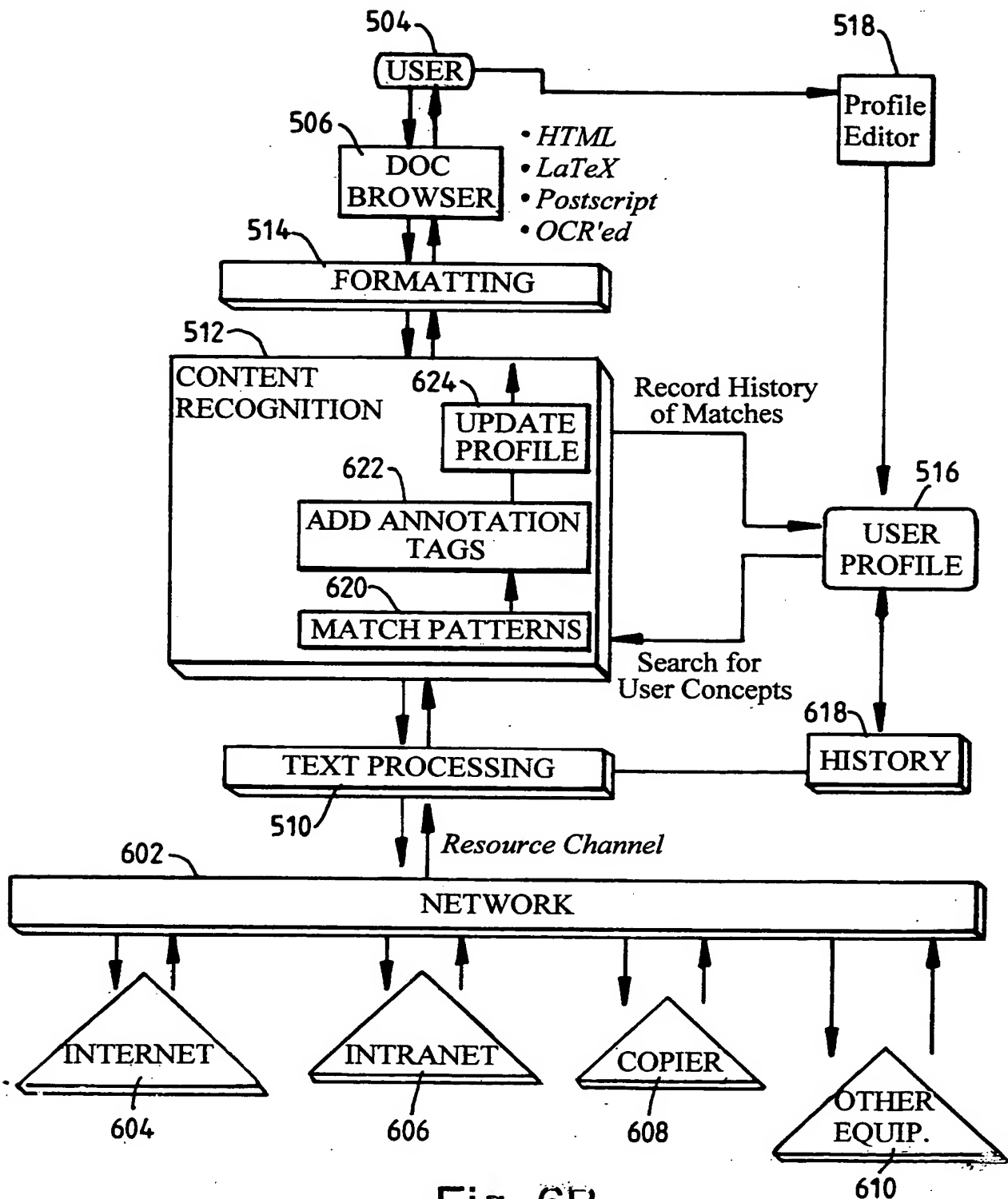


Fig. 6B

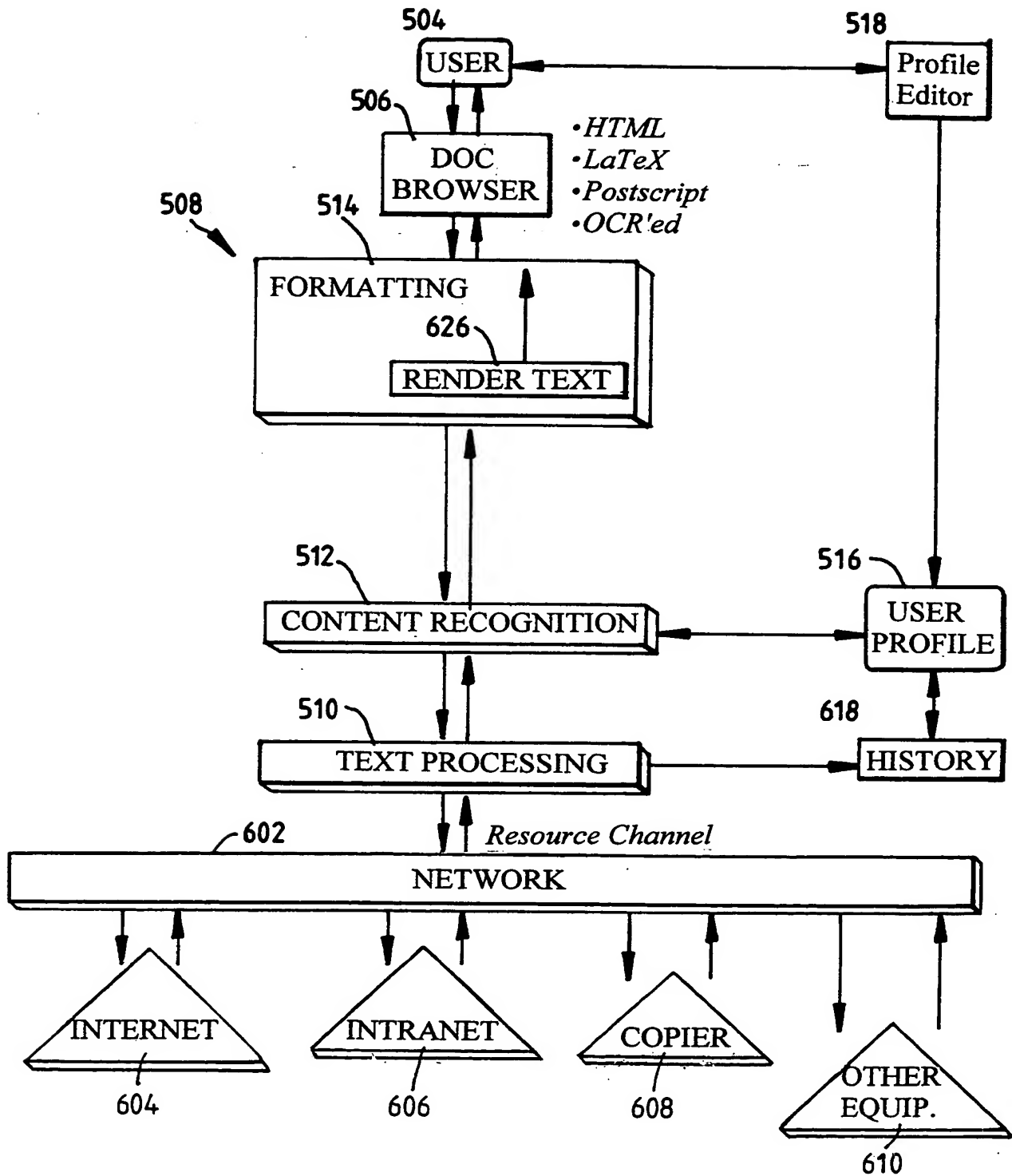


Fig. 6C

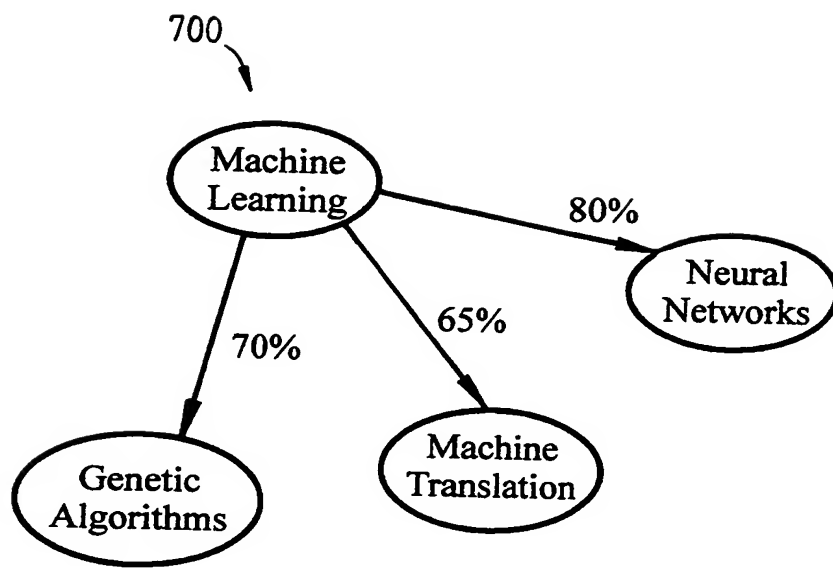


Fig. 7

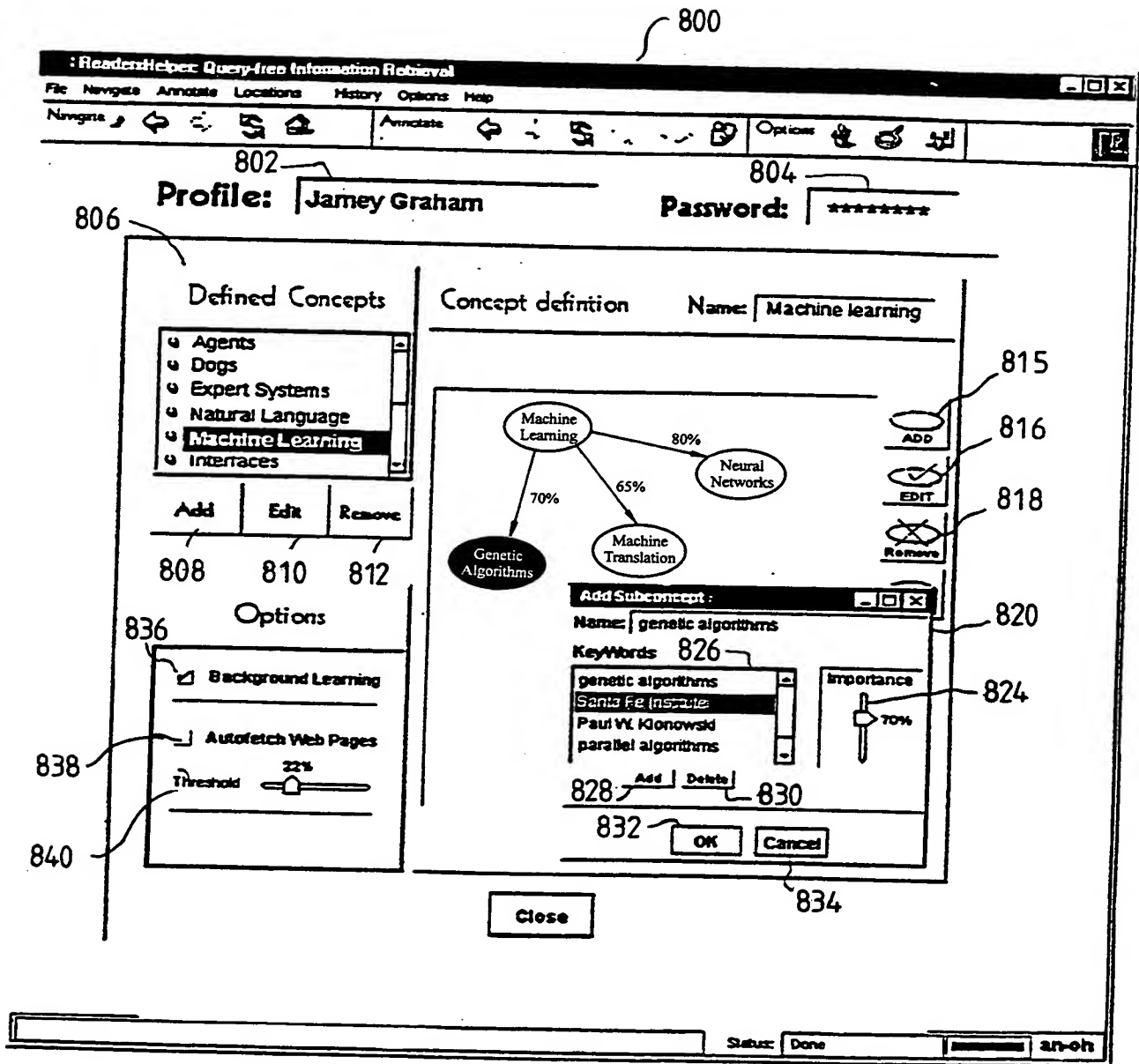


Fig. 8

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http://internal.crc.ncoi.com/~jameyfoot/rh/foot.html

of substantial complexity be integrated within a larger system context? By requiring that all interactions with the legacy database be mediated by the agent, we have been able to isolate the database system cleanly while still supporting query-free information retrieval.

FDKIT is comprised of the three subsystems already mentioned: the probabilistic expert system, the legacy full-text database system (to which we added a new, semantically-based, indexing structure that supports limited natural language queries), and the intelligent agent that effectively integrates them. The following sections describe these system components, provide implementation details, illustrate the runtime behavior of FDKIT, report on operational experience, and close with some observations about query-free information retrieval and the potential for generalizing the underlying paradigm.

FDKIT's System Components

We first describe the probabilistic expert system and, describing these, we stress that our purpose was not necessarily to exploit fully the best current components or indeed even to exploit fully the best current Expert System Component.

For our purely diagnostic applications, we elected to use the belief net (or Bayesian net) representation that has received considerable attention in recent years.

Belief networks use conditional probabilities of the form $p(s_j | f_i)$ to represent associations between a fault f_i and an observable symptom s_j that it may produce. A knowledge base for a belief net expert system consists principally of a collection of conditional probabilities of this form.

The relations among faults and symptoms are conveniently represented as a directed acyclic graph as shown in Figure 1.

Select Concept

- Agents
- Dogs
- Expert Systems
- Natural Language
- Machine Learning
- Interfaces

OK Cancel

902

em. Before briefly of the individual in their integration.

CONCEPTS

- ☒ Agents (33%)
- ☒ Java (0%)
- ☒ Interface (4%)
- ☒ NLP (33%)
- ☒ Wearable (0%)
- ☒ Bayes (70%)
- ☒ ExpSys (94%)
- ☒ Speech (0%)
- ☐ SARDog (0%)
- ☐ NOA (0%)
- ☐ Viro (0%)
- ☒ Virtual (0%)
- ☒ DA (0%)

10%

Figure 1: Directed Acyclic Graph (DAG) showing Faults and Symptoms

```

graph TD
    D_Server[D_Server] --> E_Mail[E_Mail Copies]
    D_Server --> Blind_Wrench[Blind Wrench]
    D_Server --> Light_Copies[Light Copies]
    D_Server --> Toner_Discharge[Toner Discharge]
    E_Mail --> Over_Toning[Over-Toning]
    Blind_Wrench --> Over_Toning
    Blind_Wrench --> Light_Copies
    Toner_Discharge --> Light_Copies
  
```

Status: Done

Fig 9A

ReaderHelper: Query-free Information Retrieval

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N A <http://internal.crc.ncoi.com/~jamey/bath/vb1.htm>

of substantial complexity be integrated within a larger system context? By requiring that all interactions with the legacy database be mediated by the agent, we have been able to isolate the database system cleanly while still supporting query-free information retrieval.

FLXIT is composed of the three subsystems already mentioned: the probabilistic **expert system**, the legacy full-text database system (to which we added a new, semantically-based, indexing structure that supports limited natural language queries), and the **Intelligent agent** that effectively integrates them. The following sections describe these system components, provide implementation details, illustrate the runtime behavior of FLXIT, report on operational experience, and close with some observations about query-free information retrieval and the potential for generalizing the architecture.

FLXIT's System

Expert Systems

We first describe the **probabilistic expert system**. In describing these, we stress that our purpose was not components or indeed even to exploit fully the best of Expert System Component.

For our purely diagnostic applications, we elected to received considerable attention in recent years.

Belief networks use conditional probabilities of the form $p(s_i | f_i)$ to represent associations between a fault f_i and an observable symptom s_j that it may produce. A **knowledge base for a belief net expert system** consists principally of a collection of conditional probabilities of this form.

The relations among faults and symptoms are conveniently represented as a directed acyclic graph as shown in Figure 1.

Select Concept

Enter Feedback

Good
Medium (not sure)
Bad

OK Cancel

CONCEPTS

- ☒ Agents (33%)
- ☒ Java (0%)
- ☒ Interface (4%)
- ☒ NLP (33%)
- ☒ Wearable (0%)
- ☒ Bayes (70%)
- ☒ ExpSys (94%)
- ☒ Speech (0%)
- ☐ SARDog (0%)
- ☐ NOA (0%)
- ☐ Viro (0%)
- ☒ Visual (0%)
- ☒ DA (0%)

18%

Status Done

Fig. 9B

1006 <RH.ANOH.S NUMBER=4> 1002 1008
 We have approached this challenge by introducing an
 <RH.ANOH CONCEPT="Intelligent Agents" SUBCONCEPT=" intelligent agent" SEN-
 TENCE="4" NUMBER=1>intelligent agent </RH.ANOH> that analyzes interactions
 between user and <RH.ANOH CONCEPT="Bayes Inference" SUBCONCEPT=" expert system"
 SENTENCE="4" NUMBER=3>expert system </RH.ANOH> and automatically constructs
 database queries based on this analysis</RH.ANOH.S>. The user is unobtrusively
 notified when information relevant to the current diagnostic context has been
 returned, and may immediately access it if desired. From the user's perspec-
 tive all database machinery is entirely transparent; indeed no formal query
 language is even made available. Hence we term this approach query-free infor-
 mation retrieval. <p>

1006 <RH.ANOH.S NUMBER=5> 1002 1008 1004
 As we hope will be apparent from what follows, the introduction of the
 <RH.ANOH CONCEPT="Intelligent Agents" SUBCONCEPT=" intelligent agent" SEN-
 TENCE="5" NUMBER=2>intelligent agent </RH.ANOH> additionally offers one solu-
 tion to a fundamental problem facing designers of cooperative information
 systems: How can legacy systems of substantial complexity be integrated within
 a larger system context</RH.ANOH.S>? By requiring that all interactions with
 the legacy database be mediated by the agent, we have been able to isolate the
 database system cleanly while still supporting query-free information
 retrieval. <p>

1006 <RH.ANOH.S NUMBER=6> 1002 1004 1008 1006
 FIXIT is comprised of the three subsystems already mentioned: the probabilistic
 <RH.ANOH CONCEPT="Bayes Inference" SUBCONCEPT=" expert system" SENTENCE="6"
 NUMBER=4>expert system </RH.ANOH>, the legacy full-text database system (to
 which we added a new, semantically-based indexing structure that supports lim-
 ited <RH.ANOH CONCEPT="Natural Language" SUBCONCEPT=" natural language" SEN-
 TENCE="6" NUMBER=1>natural language </RH.ANOH> queries), and the <RH.ANOH CON-
 CEPT="Intelligent Agents" SUBCONCEPT=" intelligent agent" SENTENCE="6" NUM-
 BER=3>intelligent agent </RH.ANOH> that effectively integrates
 them</RH.ANOH.S>. The following sections describe these system components, pro-
 vide implementation details, illustrate the runtime behavior of FIXIT, report
 on operational experience, and close with some observations about query-free
 information retrieval and the potential for generalizing the underlying para-
 digm.<p>

<h2> FIXIT's System Components</h2>
 We first describe the probabilistic expert sub-system and the information
 retrieval sub-system. Before briefly describing these, we stress that our pur-
 pose was not necessarily to advance the capabilities of the individual compo-
 nents or indeed even to exploit fully the best current technology; instead, we
 focus on their integration.<p>
 <p>

Fig. 10



Application No: GB 9827135.6
Claims searched: 1-11,14-25,28-31

Examiner: Mike Davis
Date of search: 27 January 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): G4A (AUXX, AADB)

Int Cl (Ed.6): G06F

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	EP 0802492 A1 (IBM) eg pages 2-9 and Figs.11-15	1,2,14,28, 30 at least
X	EP 0762297 A2 (SUN) eg pages 2-5, and page 10 line 52 to page 11 line 39	"
X	EP 0378848 A2 (IBM) eg abstract and page 4 lines 18-20	"
X	US 5404295 (KATZ ET AL) eg columns 1-4, and column 12 line 50 to column 13 line 24	"

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.